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EXAMINER

FENTY, JESSE A

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/652,994

Applicant(s)

AGARWAL, VISHNU K.

Examiner

Jesse A. Fenty

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 73-75 and 77-94 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 73-75, 77, 78 and 80-94 is/are rejected.
- 7) ☒ Claim(s) 79 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 81-94 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

- a. In re claims 81 and 88, the limitation, "passivated conductive layer" is not described in the specification with enough detail for the examiner to know the metes and bounds of said language. On pp. 7, line 26, applicant discloses the term "passivator material," but does not give any examples of such material. This appears to be the only mention of this term in the disclosure.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 81-94 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- b. In re claims 81 and 88, the term "passivated conductive layer is vague and indefinite.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 73-75, 77, 78, 80-85 and 87 are rejected under 35 U.S.C. 102(e) as being anticipated by Yang et al. (U.S. Patent No. 5,956,894).

In re claims 73 and 81, as best understood, Yang discloses a semiconductor device, comprising:

A substrate (1); and

A passivated conductive layer over the substrate, the passivated conductive layer having a reduced ability to associate with oxygen by being exposed to a material selected from the group consisting of phosphine and methylsilane (column 3, lines 13-14; column 4, lines 29, 64; claim 15).

In re claims 74 and 82, Yang discloses the devices of claims 73 and 82 respectively, wherein the conductive layer (31) comprises tungsten nitride (column 5, line 34).

In re claims 75 and 83, Yang discloses the devices of claims 74 and 83 respectively, further comprising another conductive layer (38) formed on the tungsten nitride layer.

In re claims 77 and 84, Yang discloses the devices of claims 75 and 83 respectively, wherein the other conductive layer comprises copper (column 5, line 67).

In re claims 78 and 85, Yang discloses the devices of claims 73 and 81 respectively, further comprising a second conductive layer (32) formed on the conductive layer and a third conductive layer (38) formed on the second conductive layer.

In re claims 80 and 87, Yang discloses the devices of claims 73 and 81 respectively, wherein the substrate comprises a silicon substrate.

7. Claims 88, 92 and 94, as best understood, are rejected under 35 U.S.C. 102(e) as being anticipated by Li (U.S. Patent No. 6,383,951 B1).

In re claim 88, as best understood, Li discloses an in-process device, comprising:

A substrate; and

A passivated conductive layer over the substrate, the passivated conductive layer having a reduced ability to associate with oxygen by being exposed to methylsilane (Abstract; column 3, line 47; column 4, lines 37, 44).

In re claim 92, Li discloses the device of claim 88, further comprising a second conductive layer (64) formed on the conductive layer and a third conductive layer (74) formed on the second conductive layer.

In re claim 94, Li discloses the device of claim 88, wherein the substrate comprises a silicon substrate.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 89-91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li as applied to claim 88 above, and further in view of Akram (U.S. 2002/0187633 A1).

In re claim 89, Li discloses the device of claim 88, wherein the conductive layer (12) comprises tungsten (column 7, line 34), but does not expressly disclose said layer comprising tungsten nitride. Akram discloses a similar interconnect structure comprising a tungsten nitride layer (64). It would have been obvious for one skilled in the art at the time of the invention to use tungsten nitride as disclosed by Akram for the device of Li for the purpose, for example, of diversifying the number of devices for a given design based on the commonly known characteristics of similar materials (Akram; pp. 6, section [0059]).

In re claim 90, Li in view of Akram discloses the device of claim 89, further comprising another conductive layer (74) formed on the tungsten nitride layer

In re claim 91, Li in view of Akram discloses the device of claim 90, wherein the other conductive layer (74) comprises copper (Li; section [0061]).

Allowable Subject Matter

10. Claims 79 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

c. The following is a statement of reasons for the indication of allowable subject matter: The claim, depending from claim 78, detailing the second conductive layer being tungsten nitride and the third layer comprising copper is neither anticipated nor obvious over the prior art of record.

11. Claims 86 and 93 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

12. Applicant's arguments with respect to claims 73-76 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-746-3892 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Jesse A. Fenty
Examiner
Art Unit 2815

JAF
July 14, 2003


EDDIE LEE
SUPERVISORY PATENT EXAMINER
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